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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/111,454	07/08/1998	ARIEL BEN-PORATH	49959-013	5838

7590 03/04/2002

Patent Counsel
APPLIED MATERIALS, INC.
P.O. Box 450A
Santa Clara, CA 95052

EXAMINER

BALI, VIKKRAM

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 03/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.



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Office Action Summary

Application No.
09/111,454

Applicant(s)
Ben-Porath et al

Examiner
Vikkram Bali

Art Unit
2623



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Nov 6, 2001
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 6-8, 18-20, 23-25, 35-38, and 40-48 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-8, 18-20, 23-25, 35-38, and 40-48 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

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DETAILED ACTION

In view of the appeal brief filed on 11/06/2001, PROSECUTION IS HEREBY REOPENED. A new grounds of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

- (a) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,
- (b) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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2. Claims 1-3, 6-8, 18-20, 23-25, 37-38 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. (US 5801965) in view of Broude et al. (US 5814829) and in further view of Shimizu (US 4849901).

With respect to claim 1, Takagi discloses method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices comprising "imaging the surface" (see figure 3, numerical 347, detector for the taking the image of the article); and "classifying each of the defects as being in one of a predetermined number of invariant core classes of defects", (see figure 3, numerical 352, for classification of the defects detected there are classes and subclasses as shown in the figure) as claimed. However, he fails to disclose: "determining a total number of defects in each of the core classes"; and "generating an alarm signal when the total number of defects in a specific one of the core classes is equal to or greater than a first predetermined number", as claimed. Broude in a system for inspection teaches "determining a total number of defects in each of the core classes"; and "generating a signal when the total number of defects in a specific one of the core classes is equal to or greater than a first predetermined number", (see Abstract, lines 2-12, wherein the flaws are detected and counted and the compared to an threshold and if the counter exceeds the threshold a signal is generated) as claimed.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Takagi's method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices by introducing a counter for counting

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the defects, comparing the counter to a threshold, and if the threshold exceeds a limit generating a signal as taught by Broude in his inspection system. This modification will provide an inspection system for an article that will detect the defects and classify the defects in the different classes and will have a counter for counting the defects, comparing the counter to a threshold, and if the threshold exceeds a limit generating a signal to stop the process in order to get a better yield.

Takagi and Broude discloses the invention substantially as disclosed and described above. However they fail to disclose “generating a alarm” as claimed. Shimizu in substrate inspection for flatness and alarm teaches “generating a alarm”, (see col. 8, lines 61-64, it states that a alarm ALM-2 [notifying an operator] is generated if the number of chips having a flaw i.e. poor flatness exceeds a predetermined number and eventually the system is stopped) as claimed.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Takagi's and Broude's method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices by introducing an alarm if the flaw exceeds a predetermined number on a wafer (see col. 8, lines 61-64) as taught by Shimizu, as all the references are analogous because they are solving similar problem of inspection. The motivation of combining the alarm in to the system is straight forward as in any system tat is time and money based to make sure if any fault in the inspection of the article go more than a threshold then the system provides an alarm to an operator to interface in the system in order to rectify the problem in order to better yield.

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With respect to claim 2, Takagi further discloses “core classes of defects comprise a missing pattern on the surface, an extra pattern on the surface, a particle on the surface, a particle embedded in the surface, and micro scratches on the surface”, (see figure 10, classification, which gives all the classes for classification of the defects) as claimed.

With respect to claim 3, Takagi, Broude and Shimizu discloses the invention substantially as disclose and as described above in claim 1. However, they fail to disclose “imaging the surface with a scanning electron microscope” as claimed. But, it is well known in the art of inspecting an article to use a scanning electron microscope (SEM).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Takagi, Broude and Shimizu method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices by introducing a well known feature of inspecting method i.e. scanning the article using a SEM. This modification will provide an inspection system for an article that will use a SEM to scan the article such that the article gets scan to its best image.

With respect to claim 6, Takagi further discloses “classifying the defect as being in one of an arbitrary number of variant subclasses”, (see col. 13, lines 7-9, a cause model after the classification is done for the defects could well be the sub classification of the defects) as claimed.

Claims 7-8 and 24-25 are rejected as claim 1, because claims 7-8 and 24-25 are claiming similar subject matter as claim 1.

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Claims 18, 19 and 23 are rejected as claims 1, 2 and 6, because claims 18, 19 and 23 are claiming similar subject matter as claims 1, 2 and 6.

Claim 20 are rejected as claim 3, because claim 20 are claiming similar subject matter as claim 3.

With respect to claim 37, Takagi Broude and Shimizu discloses the invention as described for claim 1. For claim 37 Takagi further discloses “an image to produce an image of the defect and a reference image; storage device to store the defect image and the reference image; a comparator to compare the defect image and the reference image; and processor to classify the defect as being in one of a predetermined number of invariant core classes of defects”, (see col. 11, lines 40-50) as claimed.

Claim 38 are rejected as claim 3, because claim 38 are claiming similar subject matter as claim 3.

With respect to claim 40, Takagi further discloses “ storage device is a digital storage device”, (see figure 3, numerical 350) as claimed.

Claim 41 are rejected as claim 6, because claim 41 is claiming similar subject matter as claim 6.

Claim 42 are rejected as claims 7 and 8, because claim 42 is claiming similar subject matter as claims 7 and 8.

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3. Claims 35-36 and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. (US 5801965) in view of Broude et al. (US 5814829) and in further view of Shimizu (US 4849901) as applied to claim 18, 38 above, and in further in view of Shahar et al (US 5591971).

With respect to claims 43-45, Takagi, Broude and Shimizu discloses the invention substantially as disclose and as described above in claim 38. However, he fails to disclose “a plurality of spaced-apart detectors and a monitor to display images produced by the plurality of detectors”; “SEM comprises an SEM column, wherein a first one of the plurality of detectors is disposed inside the SEM column and a second one of the plurality of detectors is disposed outside the SEM column”; and “a first monitor for displaying an image produced by the first detector, and a second monitor for displaying an image produced by the second detector” as claimed in claim 43, 44 and 45 respectively. Shahar in a scanning electronic microcopy teaches “a plurality of spaced-apart detectors and a monitor to display images produced by the plurality of detectors”, (see figure 1, detectors 170, 240 and 250, and for the monitor see col. 1, line 27, wherein he teaches that the signal as received by the detector can be displayed i.e. there exist a monitor to display the signal); “SEM comprises an SEM column, wherein a first one of the plurality of detectors is disposed inside the SEM column and a second one of the plurality of detectors is disposed outside the SEM column”, (see figure 1, numerical 10 for the column, numerical 170 for the detector inside the column and numerical 240 for the detector out side the column); and “a first monitor for displaying an image produced by the first detector, and a second monitor for

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displaying an image produced by the second detector”, (see col. 1, line 27, wherein, it is obvious that a monitor is present to display the signals as the signals received by the detectors) a monitor as claimed in claim 43, 44 and 45 respectively.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Takagi, Broude and Shimizu method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices by introducing the detectors and the monitors as taught by the Shahar in scanning electron microscope for giving out a better perspective of the image. This modification will provide a SEM for an inspection system for an article that will have more than one detector to detect the reflected light and there by giving a better perspective of the article.

Claim 35 and 36 is rejected as claims 43 and 44 as claims 35 and 36 are claiming similar subject matter as claims 43 and 44.

4. Claims 46-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. (US 5801965) in view of Shahar et al (US 5591971).

With respect to claim 46, Takagi in method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices disclose ‘classifying the defect as being in one of a predetermined number of classes of defects’, (see figure 3, numerical 352, for classification of the defects detected there are classes and subclasses as shown in the figure). However, Takagi fails to disclose “imaging the surface with a scanning electron

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microscope and an optical image”, as claimed in claim 46. Shahar in a scanning electronic microcopy teaches “imaging the surface with a scanning electron microscope and an optical image”, (see figure 1, numerical 10 for the column, being the SEM and numerical 240 and 250 for the optical detectors and col. 5, lines 15-21 for description), as claimed in claim 46.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Takagi’s method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices by introducing the detectors and the monitors as taught by the Shahar in scanning electron microscope for giving out a better perspective of the image. This modification will provide a SEM for an inspection system for an article that will have more then one detector to detect the reflected light and there by giving a better perspective of the article.

With respect to claim 47, Takagi further discloses “the classes of defects include the color of the surface”, (see figure 10, feature data) as claimed.

5. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi et al. (US 5801965) and Shahar et al (US 5591971) as applied to claim 46 above, and further in view of Tsuchiya et al (US 5960106).

With respect to claim 48, Takagi and Shahar discloses the invention substantially as disclose and as described above in claim 38. However, they fail to disclose “wherein the surface is glass, and the classes of defects include a particle embedded in the surface and substantially not

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protruding from the surface” as claimed. Tsuchiya in sample inspection method teaches “wherein the surface is glass, and the classes of defects include a particle embedded in the surface and substantially not protruding from the surface”, (see col. 2, lines 22-25, wherein, the glass substrate is inspected for the chrome depositing) as claimed.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Takagi’s and Shahar’s method and system for manufacturing semiconductor devices and method and system for inspecting semiconductor devices by introducing the glass substrate inspection for the embedded particles as taught by Tsuchiya in his sample inspection method. This modification will provide an inspection system for a glass article for inspecting the embedded particles on the substrate.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vikkram Bali whose telephone number is (703) 305-4510.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-4700.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, DC 20231

or faxed to:

(703) 872-9314 (for formal communications intended for entry)

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(703) 872-9314 (for informal or draft communications, such as proposed amendments to be discussed at an interview, please label "PROPOSED " or "DRAFT")

or hand-carried to:

Crystal Park Two,
2121 Crystal Drive,
Arlington, VA.
Sixth Floor (Receptionist)


AMELIA M. AU
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vb

January 25, 2002